

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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REPLY TO: 5230 Evaluation

April 17, 1978

SUBJECT: Biological Evaluation of Plantations on Foresthill
Ranger District

TO: Forest Supervisor, Tahoe N.F.

500 2222



A biological evaluation of several plantations on the Foresthill District was conducted on January 10, 1978 by John Pronos, Pathologist and David Schultz, Entomologist of the Forest Insect and Disease Management Staff, accompanied by Bob Rogers and Jeff Withroe, Foresthill District. The evaluation was requested because tree mortality began to appear following completion of the Sugar Pine Thinning Project in June, 1977.

Many of the plantations on the Foresthill District were planted following the Volcano burn of 1960. Although a mixture of ponderosa pine, Douglas-fir and sugar pine were planted, and there are also some volunteers, the predominant species in the plantations now is ponderosa pine. The plantations are located generally between 4,000-5,000 feet in elevation and most are on a deep volcanic soil. Normal precipitation for the Foresthill R.S., is 52.52 inches, but only 17.38 inches was received during 1976 and the total precipitation was 11.02 inches through October of 1977.

Evaluation

Sugar Pine Thinning Project. Thinning has been underway in an area of 134 acres for some time and was completed in June of 1977. Most of the trees in the area are 20-40 ft. tall ponderosa pine ranging from 6 to 10 inches in diameter at ground level. The trees cut during thinning were lopped to a 2 inch top and cut into bolts no longer than 10 feet. The residual stand still has over 75 percent crown closure in most areas and this probably retarded drying of the slash. An estimated 100-200 ponderosa pine in clumps of 5-10 trees in the residual stand were recently killed. All of the dead trees examined were heavily infested with pine engravers, Ips spp, and most of the slash larger than 3 inches in diameter had been used by pine engravers for breeding material. Moisture stress during the summer predisposes pines to pine engraver attack and the current drought should be considered a contributing factor to the mortality. Black stain root disease, Verticicladiella wagenerii Kend., was suspected in several of the dead trees, but diagnostic procedures failed to confirm this and it does not appear to be present in this area.

Giant Gap Ridge. A patch of recently faded young ponderosa pine adjacent to a salvage logging site was examined and found to be infested with pine engravers. The mortality was localized in an area of soil disturbance and vegetation damage connected with the salvage operation.

Jones Plantation. The Jones Plantation was examined because it is representative of some of the proposed thinning areas for this year. No current mortality was readily apparent in this area. The ponderosa pine in this plantation were only 4-10 feet tall and consequently there was a low degree of crown closure.

Mitchell Humbug Sale. The Mitchell Humbug Sale area has a scattered overstory that escaped the 1960 fire and an extremely dense understory of natural ponderosa pine regeneration. The understory is 4-8 feet tall with stems 1/2-2 inches in diameter and there are over 100,000 stems per acre. Some openings in the understory have been made in conjunction with overstory removal operations. Recent mortality due to pine engravers was noted near these openings and other natural openings and much of this mortality was more recent than the slash and disturbance produced during logging. The most likely contributing factors were a combination of exposure with two successive years of moisture stress.

Discussion

This evaluation was requested primarily to gain information and advice from FIDM to help avoid pest problems that might develop following the proposed thinning on approximately 500 acres during 1978. A problem which seems likely to occur if precautions are not taken is that pine engraver populations may increase in the slash created during thinning and then attack green trees in the residual stand.

Pine engravers breed in small diameter pine which is either alive or recently cut. There can be up to five generations per year and the overwintering generation normally suffers severe mortality. Although it is important to avoid creating large amounts of breeding material at any time of year, the most critical period is from December through June. Most trees are not under severe moisture stress at this time of year which reduces the natural breeding areas for pine engravers at a time when populations are at their lowest point. Also the slash created at this time does not dry out rapidly so it remains useable by the beetles for a long period of time. If thinning is planned earlier than June, special precautions should be taken to reduce the build-ups of pine engravers. One of the methods commonly used to make slash less suitable for pine engraver breeding is to lop and scatter the slash in sunny areas to speed drying. During the winter and early spring this method is not as effective because the sun is lower with respect to the horizon so slash may not be exposed to the sun as much and also temperatures are generally lower. If early thinning is planned, it is

safest to utilize a more intensive slash treatment such as chipping, piling and scorching stems over 2 inches in diameter to cook the cambium or piling and burning slash. Adult pine engravers should start emerging by mid-March and any slash which is still green or cut after this time will probably be attacked. The length of time necessary for pine engravers to complete a generation depends on the weather, but it could be as short as five weeks, so slash disposal work has to be completed rapidly after mid-March. If intensive slash treatments appear to be unfeasible during the early spring, it might be best to restrict early thinning to small diameter trees in open plantations like the Jones Plantation to give the greatest opportunity for the slash to dry out before pine engravers can complete a cycle.

A second problem which may result from the thinning is the introduction of Fomes annosus root rot into the thinned stands through the freshly cut stump surfaces. Although no evidence of Fomes annosus was found in any of the areas examined, this root rot is either an actual or potential problem in mid-elevation, west-side pine throughout the Sierras, and it should be considered whenever managing pine plantations.

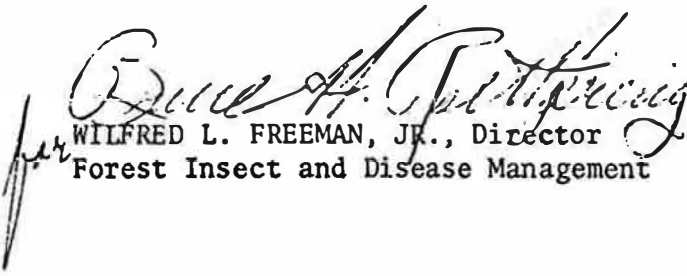
Fomes annosus enters a stand through airborne spores landing and germinating on freshly cut stumps and then spreads by root contact. Mortality due to Fomes annosus would begin to show up about five years after infection and would spread in enlarging concentric circles. The infected area could not be replanted to conifers until all the infected root material had decayed. Fomes annosus spores can be carried long distances and spore release is generally heaviest during the late winter and early spring. Successful infection is less likely as stump temperature increases because the fungus may die before reaching the root system. One method of reducing the risk of infection would be to postpone cutting until summer when spore loads are lower and temperatures are higher. Another way of reducing risk of infection would be to leave stumps 12-18 inches high so stump temperatures could increase before the fungus grows down to the roots. Annosus root rot hazard would be less if spring thinnings were restricted to plantations with wider spacing and small diameter trees like the Jones Plantation. More dense stands with larger trees could then be thinned later in the year.

Plantation Management Alternatives

1. Do not thin. If no thinning or other disturbance occurs in or near the plantations, the mortality will be minimal in the immediate future. Eventually the stand growth will stagnate and pine engravers and other bark beetles will kill some of the trees. Mortality will probably occur in groups and leave some patches with very low stocking.
2. Thin when and where convenient. If thinning is done in very densely stocked stands during the spring or if large diameter

material is cut it will probably be attacked by emerging overwintered pine engraver populations. Pine engravers breed prolifically in slash, and the results of high, mid-summer population levels can be mortality in nearby stands. Group killing may be particularly heavy if soil moisture is below normal at a time when high midsummer populations are present. Cutting low pine stumps in cool shady areas will also increase the probability of a successful Fomes annosus infection.

3. Spring thinning with special precautions. Some of the insect and disease problems associated with spring thinning can be minimized by beginning work in open plantations with small diameter stems and reserving work in dense stands or large material until the sun is higher and temperatures generally warmer. Lopping and scattering slash in sunny areas will probably reduce pine engraver buildups during the spring, but some losses should still be expected. Piling and burning slash within a month of thinning or piling stems larger than 2 inches in diameter and scorching them to make the cambium unuseable by pine engravers should prevent most of the possible buildup and mortality. Leaving high stumps, particularly if they are in sunny areas, should reduce the possibility of successful Fomes annosus infections. It is also possible to treat slash with lindane to prevent pine engraver attack and to treat stumps with borax to prevent Fomes annosus colonization, but use of these pesticides would require a pesticide-use request, an EAR, additional expense and probably as much hand labor as the methods already discussed.
4. Postpone thinning until summer. Although the potential for problems with pine engravers and Fomes annosus still exist during the summer, it is much easier to avoid these problems later in the year. The type of lopping and bucking specified in a standard thinning contract should provide adequate protection against pine engraver buildups during the summer and fall. The possibilities of Fomes annosus infection also decreases during the summer, particularly if high stumps are left.


WILFRED L. FREEMAN, JR., Director
Forest Insect and Disease Management